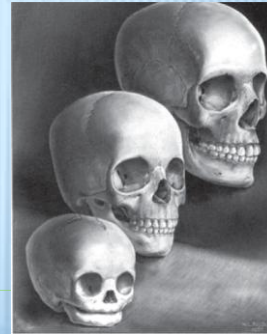


CRANIOFACIAL GROWTH AND DEVELOPMENT (1)

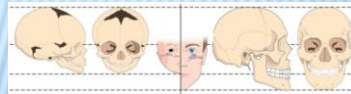
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REFERENCES

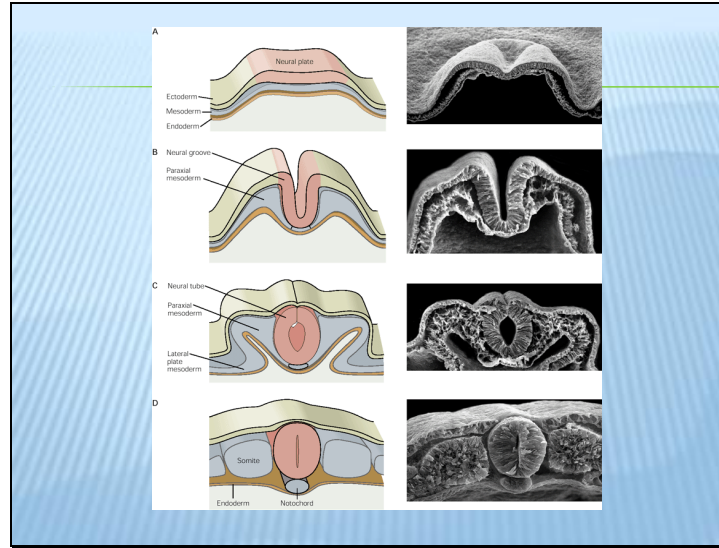
- ✦ Chapter 4 from (An introduction to Orthodontics) by Laura Mitchell (3rd edition).
- ✦ Chapter 2 from (Contemporary Orthodontics) by Proffit.

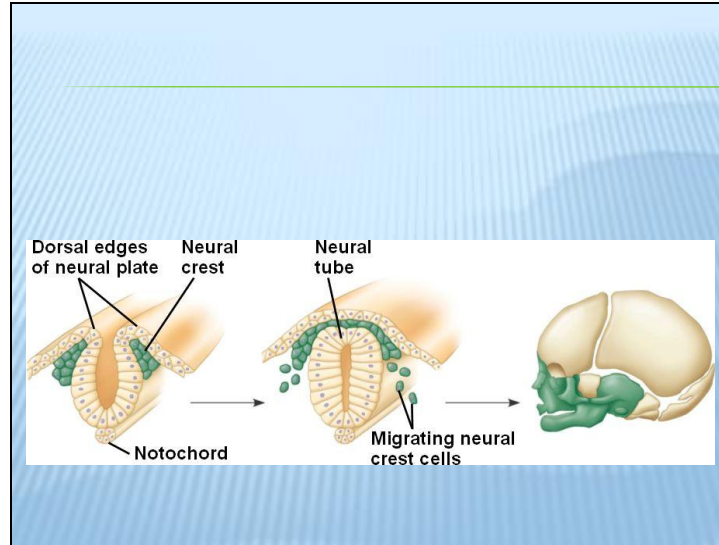


LECTURE OUTLINE

- ✦ Growth vs. Development
- ✦ Embryologic development
- ✦ Postnatal growth
- ✦ Growth: pattern, variability, and timing
- ✦ The nature of skeletal growth
- ✦ Sites and types of growth in the craniofacial complex
- ✦ Theories of growth control

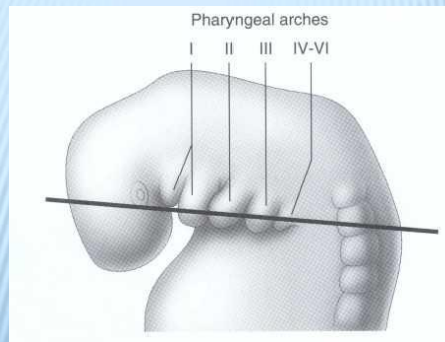






BOX 1-1 Derivatives of Three Germ Layers	
<i>Germ Layer</i>	<i>Derivative</i>
Ectoderm	
Surface ectoderm	Epidermis, hair follicles, glands of skin, nails, mammary glands, adenohypophysis, lens of eye, inner ear, and tooth <u>enamel</u>
Neural crest ectoderm	<u>Some connective tissue of head and neck (ectomesenchyme)</u> ; pharyngeal arch cartilage, bone, and muscle; <u>dentio</u> and <u>cementum</u> ; cells of spinal, cranial, and autonomic ganglia; meninges; adrenal medulla; melanocytes; and Schwann cells
Neural tube ectoderm	<u>Central nervous system</u> , retina, pineal gland, and neurohypophysis
Mesoderm	
Head	<u>Skull and some connective tissue of head</u>
Paraxial	Some muscles of head, muscles of trunk and limbs, skeleton (except skull), dermis, and connective tissue (except some in head and neck)
Intermediate	Kidneys, ovaries, testes, genital ducts, and accessory glands
Lateral	Connective tissue and muscle of viscera, serosa, primitive heart, blood and lymph cells, spleen, and adrenal cortex
Endoderm	
	Epithelial lining of digestive tract, respiratory tract, urinary bladder, and part of urethra; parenchymal cells of liver, pancreas, tonsils, thymus, thyroid gland, and parathyroid gland; epithelial lining of tympanic cavity and antrum, and auditory tube

PHARYNGEAL (BRANCHIAL) APPARATUS



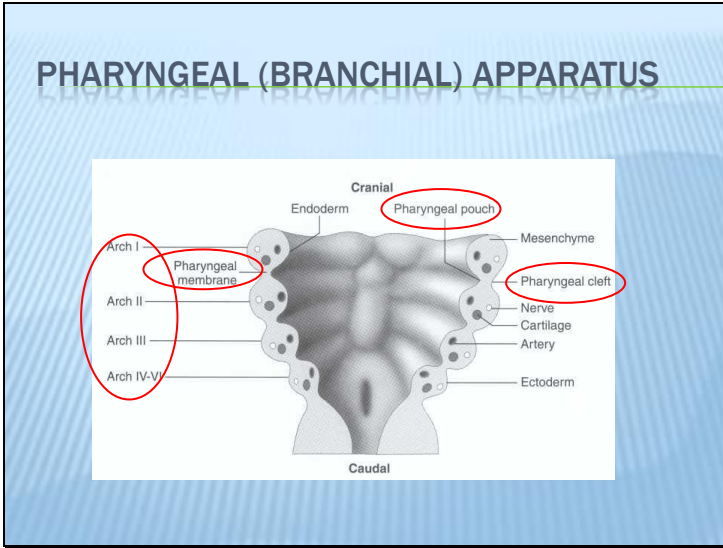


TABLE 1-1 Derivatives of the Pharyngeal Arches			
Arch	Cranial Nerve	Skeletal: Bone, Cartilage, Ligaments	Muscles
I	<u>V: Trigeminal</u>	<u>Maxillary process</u> : Maxilla, zygoma, zygomatic process of temporal bone <u>Mandibular process</u> : Meckel's cartilage, mandible, malleus, incus, sphenomandibular ligament	<u>Muscles of mastication</u> (masseter, temporalis, medial pterygoid, lateral pterygoid), anterior digastric muscle, mylohyoid, tensor veli palatini, tensor tympani
II	<u>VII: Facial</u>	<u>Reichert's cartilage</u> , stapes, styloid process of temporal bone, lesser horn and superior body of hyoid bone, stylohyoid ligament	<u>Muscles of facial expression</u> (frontalis, orbicularis oris, orbicularis oculi, zygomaticus, buccinator, platysma), stapedius, stylohyoid, and posterior belly of digastric muscle
III	IX: Glossopharyngeal	Greater horn and inferior body of hyoid bone	Stylopharyngeus muscle
IV and VI	X: Vagus	Laryngeal cartilages: thyroid, cricoid, arytenoid, and others	Cricothyroid, intrinsic muscles of larynx, constrictors of pharynx

TABLE 3-1 *Stages of Embryonic Craniofacial Development*

	Stage	Time (humans) (post-fertilization)	Related syndromes
x 1	Germ layer formation and initial organization of structures	Day 17	Fetal alcohol syndrome (FAS)
x 2	Neural tube formation	Days 18-23	Anencephaly
x 3	Origin, migration, and interaction of cell populations	Days 19-28	Hemifacial microsomia Mandibulofacial dysostosis (Treacher Collins' syndrome) Limb abnormalities
x 4	Formation of organ systems —Primary palate	Days 28-38	Cleft lip and/or palate, other facial clefts
	—Secondary palate	Days 42-55	Cleft palate
x 5	Final differentiation of tissues	Day 50-birth	Achondroplasia Synostosis syndromes (Crouzon's, Apert's, etc.)